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Good afternoon Mr. Chairman, distinguished members of the subcommittee. I am pleased to be here this afternoon to testify on behalf of NNSA to your subcommittee on the critical nature of the work underway in NNSA and how we work closely with other executive branch organizations, many of which are represented in this hearing room, to advance the nonproliferation objectives of the nation.

I. INTRODUCTION

Acquisition of nuclear and other weapons of mass destruction (WMD) and related technologies, equipment and expertise by rogue states or terrorists stands as one of the most potent threats to the United States and international security. The continued pursuit of nuclear weapons by terrorists and states of concern underscores the urgency of NNSA's efforts to secure vulnerable nuclear weapons and weapons-usable nuclear materials, to detect and interdict nuclear and radiological materials and WMD-related equipment, to halt the production of fissile material, and ultimately, to dispose of surplus weapons-usable materials.

NNSA supports the nonproliferation goals of the nation through a broad collection of programs. The Defense Nuclear Nonproliferation mission is to detect, secure and dispose of dangerous nuclear and radiological materials. To implement this mission, the Office of Defense Nuclear Nonproliferation secures civil nuclear and radiological materials worldwide; helps to secure Russian nuclear weapons material; detects and deters illicit international nuclear transfers; strengthens and works to universalize international nonproliferation efforts; eliminates weapons-usable material; and conducts cutting-edge research and development. Some examples of these programs include removing or securing nuclear materials in the former Soviet Union; installing radiation detection monitors and capabilities at major border crossings and seaports around the world – known as the Second Line of Defense program; and programs such as the Global Threat Reduction Initiative (GTRI) aimed at removing proliferation-sensitive radioactive sources both domestically and overseas. Our Office of Nonproliferation R&D supports the various NNSA programmatic missions by providing innovative technology and scientific advice.

II. NONPROLIFERATION R&D

The core mission of the Office of Nonproliferation Research and Development (R&D) is to develop the next generation of nuclear nonproliferation sensors and detection capabilities. We execute our programs through a variety of high-tech institutions and organizations, such as leading research universities, small businesses, industry, and, most importantly, the U.S. National Laboratories.

I cannot emphasize enough the importance of the National Labs to the research base for national and homeland security. The National Laboratory system has provided the critical infrastructure and technical expertise for Nonproliferation R&D for over a half century. While we supplement and complement our programs at the National Laboratories with research at universities, small businesses, and industry, the Laboratories are truly our "go to guys" for unique, cutting-edge R&D. Additionally, the Labs are critical to the transition of our technology into partner agency operational systems and platforms.

The programs of the Office of Nonproliferation R&D focus on providing long-term, stable guidance and funding to the community of researchers that provides the core of new nuclear detection technologies. We accomplish our R&D mission through two primary programmatic offices: Proliferation Detection and Nuclear Detonation Detection. The emphasis is on developing the vital technologies to detect and deter nuclear proliferation, and should detection/deterrence fail, we stand ready to meet U.S. nuclear detonation detection goals with technology used to characterize a domestic nuclear attack.

Proliferation Detection R&D

The first program, Proliferation Detection, focuses R&D resources within three primary mission areas. These include: 1) detection of foreign production of highly enriched uranium, 2) detection of foreign production of plutonium, and 3) detection of enriched uranium or plutonium being moved or transported – radiation detection technology focused on advancing the state-of-the-art to detect illicit movement of these special nuclear materials. The three mission areas are supported by "enabling" technology development in areas like remote sensing, advanced radiation detection materials, and simulation, algorithms, and modeling. Further, the proliferation detection program has a robust test and evaluation program focused on ensuring that new technologies are suitable for transitioning to the operational communities. Undergirding all this work is a final research area focused on creating a fundamental library of physical features (chemical, radiological, and spectral) of the "Signatures and Observables" expected from any foreign nuclear production program, which in turn provides a basis for developing new detector capability through either the mission or enabling technology research areas.

Nuclear Detonation Detection R&D

Our second program is Nuclear Detonation Detection. This program has three primary mission areas: 1) manufacture of the nation's operational space-based nuclear detonation detection sensors, which are integrated onto and operated by the U.S. Air Force on the nation's GPS and high altitude space systems; 2) development of the next generation of the nation's ground-based nuclear detection capabilities such as seismic detection, hydroacoustics, and infrasound – again integrated into and operated by U.S. Air Force components; and 3) development of the tools, technologies, and science related to collecting and analyzing the forensic information gathered from a nuclear detonation. The capabilities of the nuclear detonation detection R&D program are based upon decades of experience gained through the instrumentation of the U.S. nuclear testing program. The systems we develop for the Air Force have been, and continue to be, a major component of the U.S. ability to monitor the globe on the ground, from the air, and in space, 24x7, 365 days per year for foreign nuclear detonations.

The 2006 North Korean test of a nuclear device provides the most recent example of the efficacy of the cutting-edge technology we provide the Air Force for this U.S. program. In this case, the ground-based mission area of the research program had just delivered a major analysis software upgrade from Sandia, Los Alamos, and Lawrence Livermore National Laboratories to the Air Force. This new upgrade enhanced the Air Force's capability for geo-locating and discriminating an underground nuclear blast using seismic measurements, thus improving the speed and accuracy of information provided to national decision makers regarding the location, magnitude, and type of nuclear test.

III. Coordination with DoD and Other Federal Agencies

I would like to turn now to NNSA's long-standing, close, and collegial relationship with the Department of Defense, specifically the Defense Threat Reduction Agency (DTRA). I am pleased to be here testifying with Dr. Tegnelia. DTRA and NNSA, as well as our collective predecessor organizations, have nearly 60 years of close technical cooperation. From the earliest days of the Manhattan Project, through the nuclear testing era of the Cold War, and into our current programs to maintain the U.S. nuclear stockpile and counter the threat of nuclear proliferation, we have enjoyed a healthy and continuous set of joint programs. I will concentrate specifically on R&D programs devoted to nuclear nonproliferation.

A key premise of the NNSA Nonproliferation R&D program is that the ultimate outcome of any research project may have many different users – those within NNSA, the Defense Department agencies, the Military Services, the Director of National Intelligence agencies, and/or the Department of Homeland Security agencies. Therefore, we concentrate on advancing the fundamental state-of-the-art in a particular technology area, and then pass that technical capability on to a user for incorporation into a specific piece of equipment or concept of operation that complements their mission. In the case of the Department of Defense, this often means a close association with not only the R&D components of the various DoD organizations, but also with the operational components of DoD.

It is not uncommon for the scientists and engineers from our programs at the National Laboratories to be testing new equipment at locations and in conditions that are not "ideal" from a lab bench researcher's perspective. A recent example includes several researchers from Los Alamos National Laboratory conducting validation experiments of a low-light imaging camera in the tropical jungles of Central America, while accompanying a military unit. This new technology has the potential, along with other possible uses, to track movement beneath the thick jungle canopy throughout the equatorial regions of the world. While this technology was developed primarily for discovering or tracking the movement of nuclear proliferation activities, it could potentially be used for counter-narcotic or counter-terrorism operations. I mention this specific example because it illustrates the collaborative relationship we in the NNSA Nonproliferation R&D office share with our partners to link our research to real world needs, such as the larger DoD. The camera is on display in the back of the hearing room.

IV. INTERAGENCY COLLABORATION

Turning to our continuing interactions with other government agencies, I'd like to highlight some of our collaborative efforts in advancing the nation's capabilities to detect nuclear material. NNSA, under a Memorandum of Agreement with DTRA, the Department of Homeland Security's Domestic Nuclear Detection Office (DNDO), and the Director of National Intelligence's (DNI) Science and Technology Office, has integrated our R&D programs devoted to radiation detection. Not only do we review research proposals jointly, we sit on the merit review committees for each agency's programs, and thus benefit from this close collaboration. We collectively work to ensure that duplication of effort across agencies is minimized, but, more importantly, bring significantly more resources, emphasis, and senior attention to bear on areas critical to national security.

Our long term R&D program funds a wide array of cutting-edge technologies. I have select examples of radiation detection R&D and technologies under development on display in the back of the hearing room. In particular, we have one on display that we share with DTRA. We are presenting a video of the technology on a laptop, while DTRA is displaying the hardware for the Airborne Radiological Debris Collection System (ARCS) developed by Sandia National Laboratories. This smaller, lighter, lower power technology collects particulate debris from an airborne platform (manned or unmanned) to bring back for analysis. It provides significantly improved capability over current bulky, heavy, higher power debris collection systems. And, since it's integrated into a pod, it more flexibly accommodates multiple deployment platforms.

All of the projects in our display have been either developed in conjunction with DTRA, or with DTRA's DoD customer set in mind, and consciously focused to meet operational needs and requirements.

V. OTHER TECHNOLOGY EXAMPLES

I would like to draw your attention to another project that has significant potential in the proliferation detection realm. Pacific Northwest National Laboratory (PNNL) is developing a new type of hand-held radiation detector called the Pixilated Cadmium-Zinc-Telluride (CZT) Detector. This detector uses a small group of crystals ganged together in an array to provide nuclear direction finding and identification capabilities not currently seen in commercial or military equipment. This technique of combining small, high purity crystals into an array was developed to overcome the problems of larger crystals cracking or containing inclusions that significantly impair their detection capabilities.

Lawrence Livermore National Laboratory created the R&D 100 Award–winning technology called the Sonoma Persistent Surveillance System, which offers the first integrated, broad-area, high-resolution, real-time motion tracking system for surveillance applications. Sonoma is unique in its ability to provide continuous, real-time video of an area the size of a small city with resolutions sufficient to track up to 8,000 moving objects for applications such as monitoring traffic, special events, border security, and harbors. Sonoma's novel imaging technologies and real-time processing have generated numerous government program spin-offs, and initial capabilities have been transferred directly to other government partners. And, during the past year, there have been several inquiries about technology transfer and the potential commercialization of the Sonoma system and its associated technologies, since it is expected to cost about one-tenth the price of comparably sized tracking systems.

VI. CONCLUSION

I have provided but a few highlights of our program and touched upon the collaborative interface and interactions our program has shared with DTRA and our other federal partners. We continue to serve as a primary long-term investor into nonproliferation R&D technologies to keep our national and homeland security operational associates on the cutting-edge.

In summary, I would like to thank the committee for this opportunity to provide information on the critical nuclear nonproliferation-related research and development underway at NNSA and the ways that we link this work with partner organizations. I look forward to answering any of your questions.